CLAIMS

1. An aluminum nitride powder characterized in that it has local maximum values in size in regions of from 3 to 15 μm, from 0.5 to 1.5 μm and 0.3 μm or less, the proportions of particles in the respective regions are from 40 to 70%, from 25 to 40% and from 0.5 to 20% on the volume basis, and it has an oxygen amount of from 0.5 to 1.5 mass%.

2. An aluminum nitride non-fired molded body characterized by comprising a molded body of a powder mixture containing the aluminum nitride powder as defined in Claim 1 and a sintering aid.

3. An aluminum nitride sintered body which is a sintered body of the aluminum nitride non-fired molded body as defined in Claim 2, characterized by having a thermal conductivity of at least 190 W/m·K and a shrinkage factor represented by the percentage of {(dimensions of the molded body before sintering)-(dimensions of the sintered body after sintering)}/(dimensions of the molded body before sintering) of at most 15%.

4. The aluminum nitride sintered body according to Claim 3, which contains the sintering aid in an amount of from 1 to 5 parts by mass per 100 parts by mass of the aluminum nitride powder.

5. The aluminum nitride sintered body according to Claim 3 or 4, wherein the sintering aid is yttrium oxide

or calcium oxide.

6. A process for producing the aluminum nitride powder as defined in Claim 1, which comprises dispersively mixing a raw material aluminum powder having an average particle size of at most 40 μm and an oxygen amount of at most 0.5 mass% with a nitrogen gas in a proportion of at most 100 g per 1 Nm^3 of the nitrogen gas, atomizing the gas into a reaction tube for nitriding, and collecting the product in a collection system, characterized in that the oxygen concentration at a portion at which the temperature will be at least 100°C in the reaction tube and the collection system is controlled to be at most 100 ppm, and the product is taken out at a temperature of at most 100°C.

7. The process according to Claim 6, wherein the formed aluminum nitride powder has a BET specific surface area of at least 10 m^2/g and a value of the oxygen amount (mass%)/the specific surface area (m^2/g) of from 0.1 to 0.2.